

ORDER FOR SUPPLIES OR SERVICES

PAGE OF PAGES

1

4

IMPORTANT: Mark all packages and papers with contract and/or order numbers.

1. DATE OF ORDER 09/21/2017		2. CONTRACT NO. (If any) EP-C-17-031		6. SHIP TO: a. NAME OF CONSIGNEE CPOD	
3. ORDER NO. 0002		4. REQUISITION/REFERENCE NO. See Schedule			
5. ISSUING OFFICE (Address correspondence to) CPOD US Environmental Protection Agency 26 West Martin Luther King Drive Mail Code: NWD Cincinnati OH 45268				b. STREET ADDRESS US Environmental Protection Agency 26 West Martin Luther King Drive Mail Code: NWD	
				c. CITY Cincinnati	e. ZIP CODE 45268
7. TO: George Townsend				f. SHIP VIA	
a. NAME OF CONTRACTOR TETRA TECH, INC.				8. TYPE OF ORDER	
b. COMPANY NAME				<input type="checkbox"/> a. PURCHASE <input checked="" type="checkbox"/> b. DELIVERY REFERENCE YOUR: Please furnish the following on the terms and conditions specified on both sides of this order and on the attached sheet, if any, including delivery as indicated.	
c. STREET ADDRESS 10306 EATON PL STE 340				Except for billing instructions on the reverse, this delivery order is subject to instructions contained on this side only of this form and is issued subject to the terms and conditions of the above-numbered contract.	
d. CITY FAIRFAX		e. STATE VA	f. ZIP CODE 220302201		
9. ACCOUNTING AND APPROPRIATION DATA See Schedule				10. REQUISITIONING OFFICE ORD/OARS/EMD/CIN	

11. BUSINESS CLASSIFICATION (Check appropriate box(es)) <input type="checkbox"/> a. SMALL <input checked="" type="checkbox"/> b. OTHER THAN SMALL <input type="checkbox"/> c. DISADVANTAGED <input type="checkbox"/> d. WOMEN-OWNED <input type="checkbox"/> e. HUBZone <input type="checkbox"/> f. SERVICE-DISABLED VETERAN-OWNED <input type="checkbox"/> g. WOMEN-OWNED SMALL BUSINESS (WOSB) ELIGIBLE UNDER THE WOSB PROGRAM <input type="checkbox"/> h. EDWOSB				12. F.O.B. POINT Destination	
13. PLACE OF a. INSPECTION Destination		b. ACCEPTANCE Destination		14. GOVERNMENT B/L NO.	
				15. DELIVER TO F.O.B. POINT ON OR BEFORE (Date) 03/31/2019	
16. DISCOUNT TERMS					

17. SCHEDULE (See reverse for Rejections)

ITEM NO. (a)	SUPPLIES OR SERVICES (b)	QUANTITY ORDERED (c)	UNIT (d)	UNIT PRICE (e)	AMOUNT (f)	QUANTITY ACCEPTED (g)
	DUNS Number: 198549560 Firm Fixed Price TO Regional Monitoring Networks This task order is fully funded. \$50,000.00 is allocated from the base Continued ...					

SEE BILLING INSTRUCTIONS ON REVERSE	18. SHIPPING POINT		19. GROSS SHIPPING WEIGHT		20. INVOICE NO.		17(h) TOTAL (Cont. pages)
	21. MAIL INVOICE TO:						
	a. NAME RTP Finance Center						\$129,724.00
	b. STREET ADDRESS (or P.O. Box) US Environmental Protection Agency RTP-Finance Center (AA216-01) 109 TW Alexander Drive www2.epa.gov/financial/contracts						\$129,724.00
c. CITY Durham			d. STATE NC	e. ZIP CODE 27711		17(i) GRAND TOTAL	

22. UNITED STATES OF AMERICA BY (Signature)

09/21/2017

ELECTRONIC SIGNATURE

23. NAME (Typed)
Candice Charlton
TITLE: CONTRACTING/ORDERING OFFICER

ORDER FOR SUPPLIES OR SERVICES
SCHEDULE - CONTINUATION

PAGE NO
2

IMPORTANT: Mark all packages and papers with contract and/or order numbers.

DATE OF ORDER 09/21/2017	CONTRACT NO. EP-C-17-031	ORDER NO. 0002
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ITEM NO. (a)	SUPPLIES/SERVICES (b)	QUANTITY ORDERED (c)	UNIT (d)	UNIT PRICE (e)	AMOUNT (f)	QUANTITY ACCEPTED (g)
0002	<p>contract and \$79,724.00 is obligated; for a total full funding of \$129,724.00 TOCOR: Britta Bierwagen Admin Office: CPOD US Environmental Protection Agency 26 West Martin Luther King Drive Mail Code: NWD Cincinnati OH 45268 Period of Performance: 10/01/2017 to 03/31/2019</p> <p>Technical Support for NCEA's Ecological Risk Assessment Programs</p> <p>Task Order Issuance Line Item: Technical Support for EPA/ORD/NCEA's Ecological Assessment Programs Requisition No: PR-CPOD-17-00155, PR-ORD-16-00894, PR-ORD-17-01962</p> <p>Accounting Info: 16-17-C-262W000-101FK6XR1-2532-26A5C-17262WC740-003 BFY: 16 EFY: 17 Fund: C Budget Org: 262W000 Program (PRC): 101FK6XR1 Budget (BOC): 2532 Cost: 26A5C DCN - Line ID: 17262WC740-003 Funding Flag: Partial Funded: \$0.00</p> <p>Accounting Info: 16-17-C-262W000-401F84-2532-26A5C-17262WC740-004 BFY: 16 EFY: 17 Fund: C Budget Org: 262W000 Program (PRC): 401F84 Budget (BOC): 2532 Cost: 26A5C DCN - Line ID: 17262WC740-004 Funding Flag: Partial Funded: \$0.00</p> <p>Accounting Info: 17-18-C-262W000-201FK7-2532-26A5C-17262WC740-002 BFY: 17 EFY: 18 Fund: C Budget Org: 262W000 Program (PRC): 201FK7 Budget (BOC): 2532 Cost: 26A5C DCN - Line ID: 17262WC740-002 Funding Flag: Partial Funded: \$2,116.00</p> <p>Accounting Info: Continued ...</p>				129,724.00	

TOTAL CARRIED FORWARD TO 1ST PAGE (ITEM 17(H))

\$129,724.00

ORDER FOR SUPPLIES OR SERVICES
SCHEDULE - CONTINUATION

PAGE NO
3

IMPORTANT: Mark all packages and papers with contract and/or order numbers.

DATE OF ORDER 09/21/2017	CONTRACT NO. EP-C-17-031	ORDER NO. 0002
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ITEM NO. (a)	SUPPLIES/SERVICES (b)	QUANTITY ORDERED (c)	UNIT (d)	UNIT PRICE (e)	AMOUNT (f)	QUANTITY ACCEPTED (g)
	<p>17-18-C-262W000-101FK6XR1-2532-26A5C-1 7262WC740-001 BFY: 17 EFY: 18 Fund: C Budget Org: 262W000 Program (PRC): 101FK6XR1 Budget (BOC): 2532 Cost: 26A5C DCN - Line ID: 17262WC740-001 Funding Flag: Partial Funded: \$25,241.00 Accounting Info: 17-18-C-262W000-101FK6XR1-2532-26A5C-1 7262WC748-001 BFY: 17 EFY: 18 Fund: C Budget Org: 262W000 Program (PRC): 101FK6XR1 Budget (BOC): 2532 Cost: 26A5C DCN - Line ID: 17262WC748-001 Funding Flag: Partial Funded: \$19,360.69 Accounting Info: 17-18-C-262W000-401F84-2532-26A5C-1726 2WC748-002 BFY: 17 EFY: 18 Fund: C Budget Org: 262W000 Program (PRC): 401F84 Budget (BOC): 2532 Cost: 26A5C DCN - Line ID: 17262WC748-002 Funding Flag: Partial Funded: \$33,006.31 Delivery-Payment Schedule The table below presents the payment amount associated with each deliverable. TBD deliverables will be invoiced with other deliverable invoices when possible. Acceptance for invoicing is based on deliverable approval by the TOCOR. For efficient processing IAW FAR clause 52.232-32, the performance based payment invoicing amounts below will not be submitted until the TOCOR provides deliverable approval. The TOCOR will notify Tetra Tech within 14 days of submission of a deliverable of EPAs intention to approve or disapprove.</p> <p>Deliverables(Estimated Invoice Date-on or after)Amount 1.2.A/1.2.B/3.1.A/2.1.A/2.2.A/5.A(25-Nov-17) \$11,357.43 3.1.B/5.B/3.1.E/5.I(15-Jan-18)\$7,052.72 5.C/3.2.A/3.2.B/5.D/6.A/5.E(9-Mar-18)\$25,497 .29 Continued ...</p>					
TOTAL CARRIED FORWARD TO 1ST PAGE (ITEM 17(H))					\$0.00	

ORDER FOR SUPPLIES OR SERVICES

SCHEDULE - CONTINUATION

PAGE NO
4

IMPORTANT: Mark all packages and papers with contract and/or order numbers.

DATE OF ORDER 09/21/2017	CONTRACT NO. EP-C-17-031	ORDER NO. 0002
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ITEM NO. (a)	SUPPLIES/SERVICES (b)	QUANTITY ORDERED (c)	UNIT (d)	UNIT PRICE (e)	AMOUNT (f)	QUANTITY ACCEPTED (g)
	3.2.C/3.3.A/8.A/6.B(23-Apr-18) \$8,349.96 3.2.D/5.F/3.3.B/8.B(18-May-18) \$17,819.77 3.2.E/3.3.C/8.C/3.1.D(30-Jun-18) \$10,166.09 5.G/5.H/8.D(27-Jul-18) \$6,846.22 3.3.D/8.E/3.3.E(14-Sep-18) \$4,770.65 3.1.C(30-Mar-19) \$1,244.29 2.1.B(TBD) \$2,282.07 2.2.B(TBD) \$2,282.07 4.A(TBD) \$5,395.44 4.B(TBD) \$3,319.86 4.C(TBD) \$1,244.29 4.D(TBD) \$5,395.44 4.E(TBD) \$2,282.07 6.C(TBD) \$2,282.07 6.D(TBD) \$1,763.18 7.A(TBD) \$3,319.86 7.B(TBD) \$2,282.07 7.C(TBD) \$2,282.07 7.D(TBD) \$1,244.29 7.E(TBD) \$1,244.29 FIRM FIXED PRICE TOTAL:\$129,724.00					

TOTAL CARRIED FORWARD TO 1ST PAGE (ITEM 17(H))

\$0.00

PERFORMANCE WORK STATEMENT
EP-C-17-031
PR-ORD-17-01962
TO # TBD

TITLE: Vulnerability-based Framework to Assess Long-term Trends and Resilience in Aquatic Ecosystems

EAS Short Title: Regional Monitoring Networks

Task Order COR (TOCOR)	Alternate Task Order COR (ATOCOR)
Name: Britta Bierwagen Office: ORD/NCEA/GCRP 1200 Pennsylvania Ave., NW (MC 8601P) Washington, DC 20460 Phone: 703-347-8613 Fax: 703-347-8694 Email: Bierwagen.Britta@epa.gov	Name: Susan Julius Office: ORD/NCEA/GCRP 1200 Pennsylvania Ave., NW (MC 8601P) Washington, DC 20460 Phone: 703-347-8619 Fax: 703-347-8694 Email: Julius.Susan@epa.gov

PERIOD OF PERFORMANCE: Date of Task Order award through 18 months following award

NCEA's Exposure Analysis and Risk Characterization Group

The National Center for Environmental Assessment's (NCEA's) Exposure Analysis and Risk Characterization Group (EARCG) within EPA's Office of Research and Development assesses complex environmental issues to inform and improve the next generation of environmental decisions. EARCG uses the best available science to inform management and policy decisions through innovative synthesis, assessment, and research to fill critical knowledge gaps by working with stakeholders and partners to identify and address both near and long term challenges associated with a changing environment. EARCG addresses scientific issues that focus on the impacts from local and global stressors to ecosystems and resources, water quality and drinking water, air quality, human health and well-being, and assessments of the impacts of potential response strategies. Of particular interest are assessments of the potential vulnerability of aquatic ecosystems to a variety of long-term stressors, including land use change, changes to biogeochemical cycles, hydrologic changes, and climatic changes, in order to inform state, tribal and regional restoration and resilience efforts. Vulnerability and adaptation assessment activities support EPA's mission and responsibilities as defined by the Clean Water Act (CWA), and are designed to build the capacity of EPA program and regional offices, water and wetland managers, and other decision-makers to protect and restore aquatic ecosystems.

BACKGROUND

The EARCG has worked with EPA's Office of Water, the Regions, states, and tribes to build capacity in long-term monitoring, deployment of continuous sensors, and development of suitable indicators to detect long-term trends. This work has led to the development of Regional

Monitoring Networks in Regions 1-7 in streams, Regions 1, 2 and 5 in lakes, and Region 3 in wetlands. The initial focus is on long-term monitoring of least-disturbed sites near headwaters. Workshops, webinars, and other presentations have led to subsequent interest by other regions and programs to conduct similar vulnerability assessments that support the development of monitoring networks to detect long-term trends in aquatic ecosystems.

PURPOSE OF THIS TASK ORDER (TO)

The purpose of this TO is to provide support to EPA to further develop vulnerability assessments across aquatic ecosystems and geographic scales that serve as the analytical foundation of Regional Monitoring Networks (RMNs). The purpose of the RMNs is to detect long-term trends at least-disturbed sites and to inform restoration activities designed to improve environmental conditions through long-term resilience. Specifically, deliverables from this TO will

- (1) inform a plan (in conjunction with EPA's National Aquatic Resource Survey team) for nationwide multi-objective monitoring networks in streams and lakes based on vulnerability assessments; and
- (2) illustrate analyses and summary statistics of continuous and discrete data collected by RMN partners.

This TO will continue to support states and tribes in the development of RMNs, the analysis of data to assess variability and trends, and the assessment of restoration activities that improve environmental conditions for long-term resilience.

DESCRIPTION OF TASKS

TASK 1: Communication and QAPP development

SubTask 1.1. Communication and Regular Reporting

The contractor shall schedule weekly project meetings throughout the period of performance of this Task Order.

Task 1.1 Deliverable 1.1: Weekly conference calls to provide status updates. Due each week for the duration of this TO.

SubTask 1.2. Develop QAPP

All work conducted under this task order shall be performed pursuant to an EPA-approved Quality Assurance Project Plan (QAPP). The QAPP shall be submitted for review and approval by the TOCOR and the EPA QA Officer 14 days after TO award. The QAPP shall be in conformance with EPA's *Requirements for Quality Assurance Project Plans* (EPA QA/R-5). Portions of this TO relevant to modeling will reference *Guidance for Quality Assurance Project Plans for Modeling* (EPA QA/G-5M), while portions of this TO relevant to geospatial data will reference *Guidance for Quality Assurance Project Plans for Geospatial Data* (EPA QA/G-5G). Elements from these sources will be used to derive a single QAPP for this TO.

All electronic deliverables (i.e., computer files) shall be submitted in a format acceptable to EPA.

Tasks 2 through 8 may not begin until receiving in writing from the EPA TOCOR that EPA has approved the QAPP.

Task 1.2 Deliverable 1.2.A: QAPP submitted to the TOCOR for review 14 days after TO award.

Task 1.2 Deliverable 1.2.B: Final QAPP addressing TOCOR's and QA officer's comments on the QAPP due one (1) week after receiving comments.

TASK 2: Advancing vulnerability assessment methods

Previous work under WA 4-01 (EP-C-12-060) has advanced both the theory and application of vulnerability assessments to support monitoring in streams. This task shall finalize articles on (1) advancing the application of vulnerability assessments and (2) using VT data to examine community responses and recovery from extreme events. Results from these tasks shall be suitable to present at national or regional meetings.

SubTask 2.1. Journal article on advancing the application of vulnerability assessments

The contractor shall revise the existing draft, "Advancing the Application of Vulnerability Assessments" for submission to *Ecology Letters* as a *Perspectives* or *Syntheses* piece.

Task 2.1 Deliverable 2.1.A: Revised journal article based on internal review comments ready for submission to journal due 4 weeks after receiving comments from TOCOR.

Task 2.1 Deliverable 2.1.B: Revised journal article based on external review comments due 4 weeks after receiving comments on Deliverable 2.1.A.

SubTask 2.2. Journal article on response and recovery of VT stream communities to heavy precipitation events and flooding

Based on internal review draft developed under WA 4-01 on contract EP-C-12-060, the contractor shall address comments and produce a revised draft journal article to submit to a suitable journal.

Task 2.2 Deliverable 2.2.A: Respond to internal review comments and submit journal article, due 4 weeks after receipt of internal review comments from TOCOR.

Task 2.1 Deliverable 2.2.B: Revised journal article based on external review comments, due 4 weeks after receiving comments on Deliverable 2.2.A.

TASK 3: Support for regional networks in streams and lakes to advance data analysis

The existing RMNs in Regions 1-7 require continued engagement to ensure that (1) continuous data is quality controlled, formatted, and discoverable by OW's 52North server; (2) biological data can be uploaded to the Water Quality Exchange; (3) states and tribes understand equipment usage and data management scripts; and (4) states and tribes provide updates on status and continue to learn from each other across the networks.

SubTask 3.1. Continue Interactions with Regions 1-7 to further monitoring methods

The contractor shall continue collaboration with Regions 1-7 and their states and tribes to help assist with continuous and discrete data management through webinars and potential workshops. This subtask shall require several conference calls and webinars among RMN participants. Interactions during regional and national meetings (e.g., SWPBA, tribal workshops, NWQMC, SFS) also may facilitate training on R scripts and equipment and participation by states and tribes. This task shall include meeting/conference travel.

Task 3.1 Deliverable 3.1.A: Conduct webinar on status of RMNs, including update on sensor deployments by partners, data collected, amendments to the RMN QAPP, site changes/additions, and other lessons learned by partners. Presentation shall include initial example analyses conducted by the Contractor on RMN data submitted thus far. Due during October 2017 based on RMN partner availability.

Task 3.1 Deliverable 3.1.B: Conduct webinar on continuous sensor R scripts and R Shiny application to familiarize RMN partners with QAQC procedures, consistent sensor configuration, taxonomic harmonization efforts using BioData as baseline, and formatting of data. The webinar also shall cover possibilities for making sensor data discoverable by OW's 52North server. Due 2 weeks after Deliverable 3.1.A.

Task 3.1 Deliverable 3.1.C: Updated status forms (describing sensor deployments and data collection for each RMN site) for each state, tribe and Region participating in RMNs. Due 2 weeks before the end of the period of performance of the TO.

Task 3.1 Deliverable 3.1.D: Conduct webinar on updates for RMN partners during summer 2018. Presentation shall include further development of methods and analyses, as well as lessons learned. Due during summer 2018 based on RMN partner availability.

Task 3.1 Deliverable 3.1.E: Develop YouTube video as training material on QAQC R scripts for continuous sensor data. Due 4 weeks after Deliverable 3.1.B.

SubTask 3.2. Develop scripts to advance continuous and discrete data analyses

The contractor shall use the data collected by existing RMNs to highlight analyses that have near-term and longer term applications to state and tribal decision making and environmental management. The contractor shall select a state or tribe to pilot the steps necessary to pull data together. Analysis outputs shall summarize the data and include visualizations of the data by site, across endpoints (e.g., temperature, hydrology, biology), and by geography (e.g., state, region).

Analyses selected as useful by partners shall be formatted for potential use by a web application that could retrieve data from continuous sensors and discrete data archives. This TO will not develop such a web application, since EPA/OW and USGS may be developing these capabilities through joint work on the Water Quality Portal. Eventually, users should be able to query the

data to calculate suitable biological metrics, in addition to thermal and hydrologic metrics through a common interface.

Task 3.2 Deliverable 3.2.A: Webinar to show RMN partners initial analysis results using discrete and continuous data collected at RMN sites to gather feedback on which analyses to further develop into web applications. Due 3 months after Deliverable 3.1.A.

Task 3.2 Deliverable 3.2.B: Draft analysis plan focusing on R code for analyses, proposed analyses, and outputs and describing potential steps for a web application, including interface, APIs, databases and servers from which to retrieve necessary data. Due 2 weeks after Deliverable 3.2.A.

Task 3.2 Deliverable 3.2.C: Final analysis plan, revised based on TOCOR input. Due 2 weeks after receipt of comments from TOCOR.

Task 3.2 Deliverable 3.2.D: Draft version of analytical scripts and summary statistics and demonstration of analyses to RMN partners. Due 1 month after Deliverable 3.2.C.

Task 3.2 Deliverable 3.2.E: Final analytical scripts and statistics incorporating RMN partner feedback and TOCOR comments. Due 1 month after Deliverable 3.2.D.

SubTask 3.3. Develop journal article that highlights RMN data analyses

Based on partner engagements in SubTasks 3.1 and 3.2, the Contractor shall develop a journal article that highlights certain states or regions in terms of their RMN data in an examination of natural variability in a variety of relevant metrics or across taxa, and explores associations between these changes and changing thermal and hydrologic conditions.

Task 3.3 Deliverable 3.3.A: Outline of article. Due 2 months after Deliverable 3.2.A.

Task 3.3 Deliverable 3.3.B: Initial draft of article and presentation to gather feedback from states/regions highlighted in article. Due 6 weeks after Deliverable 3.3.A.

Task 3.3 Deliverable 3.3.C: Revisions to analyses and article based on webinar and email feedback on Deliverable 3.3.B. Due 4 weeks after Deliverable 3.3.B.

Task 3.3 Deliverable 3.3.D: Internal review draft of article. Due 3 weeks after receipt of comments from TOCOR on Deliverable 3.3.C.

Task 3.3 Deliverable 3.3.E: External review draft to submit to journal. Due 2 weeks after receipt of internal review draft comments from TOCOR.

TASK 4: Inclusion of restoration effectiveness and recovery potential in monitoring framework within R10 Biological Condition Gradient (BCG) context

As additional RMNs begin stream monitoring efforts, a logical next step is to examine how the RMNs can interact, what remaining areas need to be sampled to provide nationwide data on climate change effects in streams, and how monitoring can feed into efforts to improve long-

term resilience of watersheds and aquatic ecosystems. The contractor shall further develop an existing white paper (from WA 4-01 on contract EP-C-12-060) on a nationwide monitoring framework to elaborate on restoration and recovery potential considerations that can help states and tribes implement and monitoring improvements in environmental conditions for long-term resilience. This work builds on interactions with Region 10 and OST on the development of a BCG framework that includes climatic considerations, and potentially interactions with Region 8 to understand long-term effectiveness of restoration.

Use of OW's recovery potential tool in the context of the R10 BCG may assist with identification of sites vulnerable to long-term thermal or hydrologic changes, when combined with other data and model outputs. The contractor shall conduct analyses appropriate to identify vulnerable sites within the context of the R10 BCG outputs.

Based on these analyses and in conjunction with Region 10 (and possibly other Regions) and OW staff in coordination with the TOCOR, the Contractor shall propose a framework for including restoration effectiveness and recovery potential of sites within the nationwide monitoring framework. The goal is to highlight sites that states and tribes can select for restoration that will ultimately improve environmental conditions and confer long-term resilience to aquatic ecosystems (if restoration is effective and sites are protected). These sites could be added to RMNs. Monitoring at these sites ideally would show improvement in environmental conditions (e.g., improvement in BCG level assignment, improvement in biological metrics) and would demonstrate resilience to long-term environmental changes (i.e., serve as refugia).

Deliverable 4.A: Generate BCG outputs for R10 sites and identify sites with greatest amount of flow and temperature change to evaluate inter-annual variability in order to rank sites by restoration or recovery potential (along with other suitable data). Due 8 weeks after TO award.

Deliverable 4.B: Using results from Deliverable 4.A., propose a framework for including restoration effectiveness and recovery potential of sites within the nationwide monitoring framework. Due 6 weeks after Deliverable 4.A.

Deliverable 4.C: Share draft framework through webinar with OW/OWOW and other RMN partners to discuss potential sites and implementation opportunities. Due 2 weeks after receiving comments from TOCOR on Deliverable 4.B.

Deliverable 4.D: Draft journal article building on existing white paper to include restoration and recovery potential considerations that can help states and tribes implement and monitoring improvements in environmental conditions for long-term resilience. Due 4 weeks after Deliverable 4.C.

Deliverable 4.E: Internal review draft incorporating comments from TOCOR and co-authors on Deliverable 4.D. Due 4 weeks after receiving comments on Deliverable 4.D.

TASK 5: Lake RMNs, QAPP, and assessment of monitoring methods report

Regions 1, 2, and 5 are developing long-term monitoring network for lakes. The contractor shall build on information gathered during webinars with states, tribes and regions to develop a

monitoring plan for lakes. The contractor shall build on a draft white paper and draft protocols (both from WA 4-01 under contract EP-C-12-060) to develop a report (may be web-based) that assesses current monitoring methods appropriate for lake RMN goals and consistent with practices developed under Task 3. This task also shall include development of a draft QAPP for lake RMNs in partnership with states and regions.

Deliverable 5.A: Develop draft outline of assessment report on monitoring methods for lake RMNs and proposed state or federal partners to engage in development of methods sections and evaluations. Due 4 weeks after TO award.

Deliverable 5.B: Hold webinar with RMN partners and OW/NLA to discuss Deliverable 5.A. Due 1 month after Deliverable 5.A.

Deliverable 5.C: Develop draft assessment report. Due 6 weeks after Deliverable 5.B.

Deliverable 5.D: Develop draft QAPP and training materials (including presentation and YouTube videos) on new methods, QAQC, sensor and data formatting presented in Deliverable 5.C. Due 3 weeks after Deliverable 5.C.

Deliverable 5.E: Present training materials and QAPP through webinar and collect feedback from partners. Due 2 weeks after approval of Deliverable 5.D.

Deliverable 5.F: Revise Deliverable 5.C. based on input to Deliverable 5.D. and submit for internal review. Due 2 weeks after Deliverable 5.E.

Deliverable 5.G.: Revise report based on internal review comments and submit comment-response document. Due 4 weeks after receipt of comments from TOCOR.

Deliverable 5.H.: Revise report based on external review comments and submit comment-response document. Due 6 weeks after receipt of comments from TOCOR.

Deliverable 5.I.: Finalized QAPP on lakes protocols. Due 2 weeks after Deliverable 5.D.

TASK 6: Finalize synthesis of current research on climate-relevant traits and suites of traits for publication

The Contractor shall take the lead in coordinating authors from the 2016 Society for Freshwater Science special session to submit sections for the paper, gather input on a first draft from the author team, respond to internal review comments, and submit a paper on a synthesis of climate-relevant traits.

Deliverable 6.A: Coordinate individual contributions to the manuscript and correspond with authors during the process. Due 2 weeks after receipt of all sections from co-authors.

Deliverable 6.B: Based on comments and edits from TOCOR and co-authors, submit draft article ready for EPA internal review. Due 2 weeks after receipt of comments and edits from TOCOR and co-authors.

Deliverable 6.C: Revise article with assistance from co-authors, addressing internal review comments and developing a comment-response document. Due 4 weeks after receipt of internal review comments from TOCOR. After EPA clearance, the article may be submitted to a journal for external review.

Deliverable 6.D: Revise article with assistance from co-authors, addressing external review comments. Due 3 weeks after receipt of journal comments.

Task 7: Assist with and submit classification manuscript

The Contractor shall assist with a manuscript based on the classification analyses for Regions 1-4, including potential additional data and analyses (e.g., data for validation, validation analysis, and identification of intermittent streams), data formatting, and development of figures and maps. The manuscript shall focus on classification in terms of its applicability to monitoring for climate change effects.

Deliverable 7.A: Draft classification manuscript including additional analyses. Due 8 weeks after TO award.

Deliverable 7.B: Manuscript for internal review. Due 4 weeks after receiving comments from TOCOR on Deliverable 7.A.

Deliverable 7.C: Revised manuscript responding to internal review comments and separate comment-response document. Due 8 weeks after receiving internal review comments from TOCOR.

Deliverable 7.D: Submit paper to journal for external review. Due 1 week after Deliverable 7.C approved by TOCOR.

Deliverable 7.E: Revised manuscript responding to external review comments. Due 3 weeks after receiving external review comments from journal.

Task 8: A Plan for nationwide multi-objective monitoring networks in streams and lakes based on vulnerability assessments

The Contractor shall develop a plan for nationwide, multi-objective monitoring networks in streams and lakes based on vulnerability assessments. This plan shall be developed in conjunction with OW's National Aquatic Resource Surveys (NARS) in order to build on their goals for a long-term reference site network. The Contractor shall set up a conference call with the NARS leads to document their goals for a reference site network. The plan shall make use of the deliverables from Tasks 3-5 to integrate analytic requirements, partner input, site selection

based on vulnerability assessment and restoration/recovery potential, as well as methodological best practices for stream, lake, and wetland sampling.

Deliverable 8.A: Call with OWOW to discuss NARS goals and outline of plan that incorporates NARS goals for annual reference site sampling across aquatic ecosystems and existing RMN criteria and protocols. Due 2 weeks after Deliverable 5.F.

Deliverable 8.B: Webinar with key NARS staff and key RMN partners (e.g., R5 staff) to discuss Deliverable 8.A. Due 2 weeks after TOCOR approval of Deliverable 8.A.

Deliverable 8.C: Draft plan for nationwide multi-objective monitoring networks, incorporating feedback received on Deliverable 8.B. Due 4 weeks after Deliverable 8.B.

Deliverable 8.D: Internal review draft of plan. Due 2 weeks after receipt of comments on Deliverable 8.C.

Deliverable 8.E: External draft of plan revised based on internal review comments. Due 2 weeks after receipt of internal review comments.

SCHEDULE OF BENCHMARKS & DELIVERABLES:

Task No.	SubTask No.	DELIVERABLE	Incremental Schedule
1	1.1	1.1. Weekly conference calls	Due each week for the duration of this TO.
1	1.2	1.2.A. Update QAPP	Due 14 days after TO award.
1	1.2	1.2.B. Revised QAPP	Due 1 week after TOCOR comments
2	2.1	2.1.A. Revised journal article to submit	Due 4 weeks after receiving comments from TOCOR
2	2.1	2.1.B. Revised journal article to publish	Due 4 weeks after receiving comments on 2.1.A.
2	2.2	2.2.A. Draft journal article to submit	Due 4 weeks after receipt of comments
2	2.2	2.2.B. Revised journal article to publish	Due 4 weeks after comments on Deliverable 2.2.A.
3	3.1	3.1.A. Webinar on RMN status	Due during October 2017
3	3.1	3.1.B. Webinar on R scripts	Due 2 weeks after Deliverable 3.1.A
3	3.1	3.1.C. Updated status forms	Due 2 weeks before end of TO
3	3.1	3.1.D. Webinar on RMN updates	Due during summer 2018
3	3.1	3.1.E. YouTube training video	Due 4 weeks after Deliverable 3.1.B

3	3.2	3.2.A. Webinar on initial RMN data analyses	Due 3 months after Deliverable 3.1.A
3	3.2	3.2.B. Draft analysis plan	Due 2 weeks after Deliverable 3.2.A
3	3.2	3.2.C. Final analysis plan	Due 2 weeks after TOCOR comments
3	3.2	3.2.D. Draft version of scripts and demonstration	Due 1 month after Deliverable 3.2.C.
3	3.2	3.2.E. Final scripts	Due 1 month after Deliverable 3.2.D
3	3.3	3.3.A. Outline of article	Due 2 months after Deliverable 3.2.A
3	3.3	3.3.B. Initial article and presentation draft	Due 6 weeks Deliverable 3.3.A
3	3.3	3.3.C. Revised analyses and article	Due 4 weeks after Deliverable 3.3.B
3	3.3	3.3.D. Internal review draft	Due 3 weeks after comments on Deliverable 3.3.C
3	3.3	3.3.E. External review draft to submit	Due 2 weeks after receipt of comments
4	4	4.A. Analytical outputs	Due 8 weeks after TO initiation
4	4	4.B. Proposed framework	Due 6 weeks after Deliverable 4.A
4	4	4.C. Webinar on framework	Due 2 weeks after comments on Deliverable 4.B
4	4	4.D. Draft journal article	Due 4 weeks after Deliverable 4.C
4	4	4.E. Internal review draft	Due 4 weeks after comments on Deliverable 4.D
5	5	5.A. Draft outline of assessment report	Due 4 weeks after TO initiation
5	5	5.B. Webinar	Due 1 month after Deliverable 5.A
5	5	5.C. Draft assessment report	Due 6 weeks after Deliverable 5.B
5	5	5.D. Draft QAPP and training materials	Due 3 weeks after Deliverable 5.C
5	5	5.E. Webinar on training materials and QAPP	Due 2 weeks after Deliverable 5.D.
5	5	5.F. Revised assessment report	Due 2 weeks after deliverable 5.E
5	5	5.G. External review draft report	Due 4 weeks after receipt of internal review comments
5	5	5.H. Final report	Due 6 weeks after receipt of external review comments
5	5	5.I. Finalized QAPP	Due 2 weeks after Deliverable 5.D
6	6	6.A. Author coordination of sections	Due 2 weeks after receipt of co-author sections
6	6	6.B. Internal review draft	Due 2 weeks after receipt of comments
6	6	6.C. External review draft	Due 4 weeks after receipt of internal review comments

6	6	6.D. Final article	Due 3 weeks after journal comments
7	7	7.A. Draft classification manuscript	Due 8 weeks after TO initiation
7	7	7.B. Manuscript for internal review	Due 4 weeks after comments on Deliverable 7.A.
7	7	7.C. Revised manuscript	Due 8 weeks after comments internal review
7	7	7.D. Submit manuscript	Due 1 week after TOCOR approval of Deliverable 7.C
7	7	7.E. Revised manuscript	Due 3 weeks after receipt of comments from journal
8	8	8.A. Outline of plan	Due 2 weeks after Deliverable 5.F
8	8	8.B. Webinar	Due 2 weeks after TOCOR approval of Deliverable 8.A
8	8	8.C. Draft plan	Due 4 weeks after Deliverable 8.B
8	8	8.D. Internal review draft of plan	Due 2 weeks after comments on Deliverable 8.C
8	8.1	8.E. External draft of plan	Due 2 weeks after receipt of internal review comments

REPORTING

All documentation and reporting under this TO shall be in compliance with contract requirements. See contract clause F.2, F.3, and J.1 "List of Documents, Exhibits and Other Attachments, Number 2 - Reports of Work".

Additional requirements specific to this TO are as follows:

Electronic deliverables must be in an original file format that can be supported by EPA after the end of the Period of Performance of the TO. The standard office software at EPA is MS Office. The standard GIS software at EPA is ESRI ArcGIS.

TRAVEL

Travel is anticipated for no more than 4 conferences or regional biologists meetings under Task 3, such as Society for Freshwater Science in Detroit, MI or the R1, R3 or R4 biologists meeting.

CONTRACTOR IDENTIFICATION

Contractor personnel shall always identify themselves as Contractor employees by name and organization and physically display that information through an identification badge. Contractor personnel are prohibited from acting as the Agency's official representative.

The Contractor shall refer any questions relating to the interpretation of EPA policy, guidance, or regulation to the TOCOR.

TECHNICAL DIRECTION

The TOCOR is authorized to provide technical direction that clarifies the performance work statement (PWS) as set forth in this task order. Before initiating any action under technical direction, the contractor shall ensure that the technical direction falls within the scope of work for this task order. The technical direction shall be issued in writing by the TOCOR within four working days of verbal issuance. This will be forwarded to the CL-COR and CO for their information and necessary actions. The CO is the only individual authorized to make changes to this task order or contract. Any changes to the scope of work must be issued by the CO via modification to the task order or contract. Technical direction includes direction to the contractor that assists the contractor in accomplishing individual tasks deemed appropriate under the PWS, as well as comments and approval of reports and other deliverables.

AMENDMENT OF SOLICITATION/MODIFICATION OF CONTRACT				1. CONTRACT ID CODE		PAGE OF PAGES 1 3	
2. AMENDMENT/MODIFICATION NO. 001		3. EFFECTIVE DATE See Block 16C		4. REQUISITION/PURCHASE REQ. NO.		5. PROJECT NO. (If applicable)	
6. ISSUED BY CPD		CODE CPD		7. ADMINISTERED BY (If other than Item 6)		CODE	
US Environmental Protection Agency 26 West Martin Luther King Drive Mail Code: NWD Cincinnati OH 45268							
8. NAME AND ADDRESS OF CONTRACTOR (No., street, county, State and ZIP Code) TETRA TECH, INC. Attn: George Townsend 10306 EATON PL STE 340 FAIRFAX VA 220302201				(x)		9A. AMENDMENT OF SOLICITATION NO.	
						9B. DATED (SEE ITEM 11)	
				x		10A. MODIFICATION OF CONTRACT/ORDER NO. EP-C-17-031 0002	
						10B. DATED (SEE ITEM 13) 09/21/2017	
CODE 198549560		FACILITY CODE					
11. THIS ITEM ONLY APPLIES TO AMENDMENTS OF SOLICITATIONS							
<input type="checkbox"/> The above numbered solicitation is amended as set forth in Item 14. The hour and date specified for receipt of Offers <input type="checkbox"/> is extended. <input type="checkbox"/> is not extended. Offers must acknowledge receipt of this amendment prior to the hour and date specified in the solicitation or as amended, by one of the following methods: (a) By completing Items 8 and 15, and returning _____ copies of the amendment; (b) By acknowledging receipt of this amendment on each copy of the offer submitted; or (c) By separate letter or telegram which includes a reference to the solicitation and amendment numbers. FAILURE OF YOUR ACKNOWLEDGEMENT TO BE RECEIVED AT THE PLACE DESIGNATED FOR THE RECEIPT OF OFFERS PRIOR TO THE HOUR AND DATE SPECIFIED MAY RESULT IN REJECTION OF YOUR OFFER. If by virtue of this amendment you desire to change an offer already submitted, such change may be made by telegram or letter, provided each telegram or letter makes reference to the solicitation and this amendment, and is received prior to the opening hour and date specified.							
12. ACCOUNTING AND APPROPRIATION DATA (If required) See Schedule							
13. THIS ITEM ONLY APPLIES TO MODIFICATION OF CONTRACTS/ORDERS. IT MODIFIES THE CONTRACT/ORDER NO. AS DESCRIBED IN ITEM 14.							
CHECK ONE	A. THIS CHANGE ORDER IS ISSUED PURSUANT TO: (Specify authority) THE CHANGES SET FORTH IN ITEM 14 ARE MADE IN THE CONTRACT ORDER NO. IN ITEM 10A.						
	B. THE ABOVE NUMBERED CONTRACT/ORDER IS MODIFIED TO REFLECT THE ADMINISTRATIVE CHANGES (such as changes in paying office, appropriation date, etc.) SET FORTH IN ITEM 14, PURSUANT TO THE AUTHORITY OF FAR 43.103(b).						
	C. THIS SUPPLEMENTAL AGREEMENT IS ENTERED INTO PURSUANT TO AUTHORITY OF:						
X	D. OTHER (Specify type of modification and authority) Administrative and Mutual Agreement of Both Parties						
E. IMPORTANT: Contractor <input checked="" type="checkbox"/> is not. <input type="checkbox"/> is required to sign this document and return _____ copies to the issuing office.							
14. DESCRIPTION OF AMENDMENT/MODIFICATION (Organized by UCF section headings, including solicitation/contract subject matter where feasible.) DUNS Number: 198549560 Firm Fixed Price TO Regional Monitoring Networks This task order is fully funded. \$50,000.00 is allocated from the base contract and \$79,724.00 is obligated; for a total full funding of \$129,724.00 TOCOR: Britta Bierwagen The purpose of this modification is to update the Period of Performance. The period of performance is changed from 10.1.17 - 3.31.19 to 9.26.17 - 3.27.19 LIST OF CHANGES: Reason for Modification : Other Administrative Action Continued ... Except as provided herein, all terms and conditions of the document referenced in Item 9 A or 10A, as heretofore changed, remains unchanged and in full force and effect.							
15A. NAME AND TITLE OF SIGNER (Type or print)				16A. NAME AND TITLE OF CONTRACTING OFFICER (Type or print) Candice Charlton			
15B. CONTRACTOR/OFFEROR (Signature of person authorized to sign)		15C. DATE SIGNED		16B. UNITED STATES OF AMERICA  (Signature of Contracting Officer)		16C. DATE SIGNED 09/26/2017	

CONTINUATION SHEET	REFERENCE NO. OF DOCUMENT BEING CONTINUED EP-C-17-031/0002/001	PAGE	OF
		2	3

NAME OF OFFEROR OR CONTRACTOR
TETRA TECH, INC.

ITEM NO. (A)	SUPPLIES/SERVICES (B)	QUANTITY (C)	UNIT (D)	UNIT PRICE (E)	AMOUNT (F)
	<p>CHANGES FOR LINE ITEM NUMBER: 0002 Task Order Issuance Line Item: Technical Support for EPA/ORD/NCEA's Ecological Assessment Programs</p> <p>Period Of Performance Start Date changed from 01-OCT-17 to 26-SEP-17</p> <p>Period Of Performance End Date changed from 31-MAR-19 to 27-MAR-19</p> <p>CHANGES FOR DELIVERY LOCATION: CPOD Delivery Date changed from 03/31/2019 to 03/27/2019 Delivery: 03/27/2019 Delivery Location Code: CPOD CPOD US Environmental Protection Agency 26 West Martin Luther King Drive Mail Code: NWD Cincinnati OH 45268 USA</p> <p>Payment: RTP Finance Center US Environmental Protection Agency RTP-Finance Center (AA216-01) 109 TW Alexander Drive www2.epa.gov/financial/contracts Durham NC 27711</p> <p>FOB: Destination Period of Performance: 09/26/2017 to 03/27/2019 Delivery-Payment Schedule The table below presents the payment amount associated with each deliverable. TBD deliverables will be invoiced with other deliverable invoices when possible. Acceptance for invoicing is based on deliverable approval by the TOCOR. For efficient processing IAW FAR clause 52.232-32, the performance based payment invoicing amounts below will not be submitted until the TOCOR provides deliverable approval. The TOCOR will notify Tetra Tech within 14 days of submission of a deliverable of EPAs intention to approve or disapprove.</p> <p>Deliverables(Estimated Invoice Date-on or after)Amount 1.2.A/1.2.B/3.1.A/2.1.A/2.2.A/5.A(25-Nov-17)\$11,35 7.43 3.1.B/5.B/3.1.E/5.I(15-Jan-18)\$7,052.72 Continued ...</p>				

CONTINUATION SHEET	REFERENCE NO. OF DOCUMENT BEING CONTINUED	PAGE	OF
	EP-C-17-031/0002/001	3	3

NAME OF OFFEROR OR CONTRACTOR
TETRA TECH, INC.

ITEM NO. (A)	SUPPLIES/SERVICES (B)	QUANTITY (C)	UNIT (D)	UNIT PRICE (E)	AMOUNT (F)
	5.C/3.2.A/3.2.B/5.D/6.A/5.E (9-Mar-18) \$25,497.29				
	3.2.C/3.3.A/8.A/6.B (23-Apr-18) \$8,349.96				
	3.2.D/5.F/3.3.B/8.B (18-May-18) \$17,819.77				
	3.2.E/3.3.C/8.C/3.1.D (30-Jun-18) \$10,166.09				
	5.G/5.H/8.D (27-Jul-18) \$6,846.22				
	3.3.D/8.E/3.3.E (14-Sep-18) \$4,770.65				
	3.1.C (30-Mar-19) \$1,244.29				
	2.1.B (TBD) \$2,282.07				
	2.2.B (TBD) \$2,282.07				
	4.A (TBD) \$5,395.44				
	4.B (TBD) \$3,319.86				
	4.C (TBD) \$1,244.29				
	4.D (TBD) \$5,395.44				
	4.E (TBD) \$2,282.07				
	6.C (TBD) \$2,282.07				
	6.D (TBD) \$1,763.18				
	7.A (TBD) \$3,319.86				
	7.B (TBD) \$2,282.07				
	7.C (TBD) \$2,282.07				
	7.D (TBD) \$1,244.29				
	7.E (TBD) \$1,244.29				
	FIRM FIXED PRICE TOTAL:\$129,724.00				

AMENDMENT OF SOLICITATION/MODIFICATION OF CONTRACT			1. CONTRACT ID CODE		PAGE OF PAGES		
					1 2		
2. AMENDMENT/MODIFICATION NO.		3. EFFECTIVE DATE		4. REQUISITION/PURCHASE REQ. NO.		5. PROJECT NO. (If applicable)	
P00002		See Block 16C		PR-ORD-19-00529			
6. ISSUED BY		CODE		7. ADMINISTERED BY (If other than Item 6)		CODE	
CAD							
CAD							
US Environmental Protection Agency							
26 West Martin Luther King Drive							
Mail Code: W136							
Cincinnati OH 45268-0001							
8. NAME AND ADDRESS OF CONTRACTOR (No., street, county, State and ZIP Code)				(x)			
TETRA TECH, INC.				9A. AMENDMENT OF SOLICITATION NO.			
Attn: George Townsend							
10306 EATON PL STE 340				9B. DATED (SEE ITEM 11)			
FAIRFAX VA 22030							
				x			
				10A. MODIFICATION OF CONTRACT/ORDER NO.			
				EP-C-17-031			
				0002			
				10B. DATED (SEE ITEM 13)			
				09/21/2017			
CODE 198549560		FACILITY CODE					
11. THIS ITEM ONLY APPLIES TO AMENDMENTS OF SOLICITATIONS							
<input type="checkbox"/> The above numbered solicitation is amended as set forth in Item 14. The hour and date specified for receipt of Offers <input type="checkbox"/> is extended. <input type="checkbox"/> is not extended. Offers must acknowledge receipt of this amendment prior to the hour and date specified in the solicitation or as amended, by one of the following methods: (a) By completing Items 8 and 15, and returning _____ copies of the amendment; (b) By acknowledging receipt of this amendment on each copy of the offer submitted; or (c) By separate letter or electronic communication which includes a reference to the solicitation and amendment numbers. FAILURE OF YOUR ACKNOWLEDGEMENT TO BE RECEIVED AT THE PLACE DESIGNATED FOR THE RECEIPT OF OFFERS PRIOR TO THE HOUR AND DATE SPECIFIED MAY RESULT IN REJECTION OF YOUR OFFER. If by virtue of this amendment you desire to change an offer already submitted, such change may be made by letter or electronic communication, provided each letter or electronic communication makes reference to the solicitation and this amendment, and is received prior to the opening hour and date specified.							
12. ACCOUNTING AND APPROPRIATION DATA (If required)							
See Schedule							
13. THIS ITEM ONLY APPLIES TO MODIFICATION OF CONTRACTS/ORDERS. IT MODIFIES THE CONTRACT/ORDER NO. AS DESCRIBED IN ITEM 14.							
CHECK ONE							
A. THIS CHANGE ORDER IS ISSUED PURSUANT TO: (Specify authority) THE CHANGES SET FORTH IN ITEM 14 ARE MADE IN THE CONTRACT ORDER NO. IN ITEM 10A.							
B. THE ABOVE NUMBERED CONTRACT/ORDER IS MODIFIED TO REFLECT THE ADMINISTRATIVE CHANGES (such as changes in paying office, appropriation data, etc.) SET FORTH IN ITEM 14, PURSUANT TO THE AUTHORITY OF FAR 43.103(b).							
C. THIS SUPPLEMENTAL AGREEMENT IS ENTERED INTO PURSUANT TO AUTHORITY OF:							
D. OTHER (Specify type of modification and authority)							
X MUTUAL AGREEMENT BY BOTH PARTIES - NO COST EXTENSION							
E. IMPORTANT: Contractor <input type="checkbox"/> is not <input checked="" type="checkbox"/> is required to sign this document and return <u>1</u> copies to the issuing office.							
14. DESCRIPTION OF AMENDMENT/MODIFICATION (Organized by UCF section headings, including solicitation/contract subject matter where feasible.)							
DUNS Number: 198549560							
Due to delays associated with EPA discussions and internal reviews, this task order completion date needs to be extended until 9/25/2019.							
This is a no cost extension and the unpaid funds for this firm fixed price order are associated with the completion of the final deliverables.							
TOCOR: Britta Bierwagen							
Delivery: 09/25/2019							
Delivery Location Code: CP0D							
CP0D							
US Environmental Protection Agency							
Continued ...							
Except as provided herein, all terms and conditions of the document referenced in Item 9 A or 10A, as heretofore changed, remains unchanged and in full force and effect.							
15A. NAME AND TITLE OF SIGNER (Type or print)				16A. NAME AND TITLE OF CONTRACTING OFFICER (Type or print)			
				Andrea Dehne			
15B. CONTRACTOR/OFFEROR		15C. DATE SIGNED		16B. UNITED STATES OF AMERICA		16C. DATE SIGNED	
(Signature of person authorized to sign)				 (Signature of Contracting Officer)		ELECTRONIC SIGNATURE 02/14/2019	

CONTINUATION SHEET	REFERENCE NO. OF DOCUMENT BEING CONTINUED	PAGE	OF
	EP-C-17-031/0002/P00002	2	2

NAME OF OFFEROR OR CONTRACTOR

TETRA TECH, INC.

ITEM NO. (A)	SUPPLIES/SERVICES (B)	QUANTITY (C)	UNIT (D)	UNIT PRICE (E)	AMOUNT (F)
	<p>26 West Martin Luther King Drive</p> <p>Mail Code: NWD</p> <p>Cincinnati OH 45268 USA</p> <p>Payment:</p> <p>RTP Finance Center</p> <p>US Environmental Protection Agency</p> <p>RTP-Finance Center (AA216-01)</p> <p>109 TW Alexander Drive</p> <p>www2.epa.gov/financial/contracts</p> <p>Durham NC 27711</p> <p>Period of Performance: 09/26/2017 to 09/25/2019</p>				

AMENDMENT OF SOLICITATION/MODIFICATION OF CONTRACT		1. CONTRACT ID CODE		PAGE OF PAGES	
				1 2	
2. AMENDMENT/MODIFICATION NO. P00003		3. EFFECTIVE DATE See Block 16C		4. REQUISITION/PURCHASE REQ. NO. PR-ORD-19-00868	
5. PROJECT NO. (If applicable)		6. ISSUED BY CODE CAD US Environmental Protection Agency 26 West Martin Luther King Drive Mail Code: W136 Cincinnati OH 45268-0001		7. ADMINISTERED BY (If other than Item 6) CODE	
8. NAME AND ADDRESS OF CONTRACTOR (No., street, county, State and ZIP Code) TETRA TECH, INC. Attn: George Townsend 10306 EATON PL STE 340 FAIRFAX VA 22030		(x)		9A. AMENDMENT OF SOLICITATION NO.	
				9B. DATED (SEE ITEM 11)	
		x		10A. MODIFICATION OF CONTRACT/ORDER NO. EP-C-17-031 0002	
				10B. DATED (SEE ITEM 13) 09/21/2017	
CODE 198549560		FACILITY CODE			

11. THIS ITEM ONLY APPLIES TO AMENDMENTS OF SOLICITATIONS

☐ The above numbered solicitation is amended as set forth in Item 14. The hour and date specified for receipt of Offers ☐ is extended. ☐ is not extended.
Offers must acknowledge receipt of this amendment prior to the hour and date specified in the solicitation or as amended, by one of the following methods: (a) By completing Items 8 and 15, and returning _____ copies of the amendment; (b) By acknowledging receipt of this amendment on each copy of the offer submitted; or (c) By separate letter or electronic communication which includes a reference to the solicitation and amendment numbers. FAILURE OF YOUR ACKNOWLEDGEMENT TO BE RECEIVED AT THE PLACE DESIGNATED FOR THE RECEIPT OF OFFERS PRIOR TO THE HOUR AND DATE SPECIFIED MAY RESULT IN REJECTION OF YOUR OFFER. If by virtue of this amendment you desire to change an offer already submitted, such change may be made by letter or electronic communication, provided each letter or electronic communication makes reference to the solicitation and this amendment, and is received prior to the opening hour and date specified.

12. ACCOUNTING AND APPROPRIATION DATA (If required)

See Schedule

13. THIS ITEM ONLY APPLIES TO MODIFICATION OF CONTRACTS/ORDERS. IT MODIFIES THE CONTRACT/ORDER NO. AS DESCRIBED IN ITEM 14.

CHECK ONE	A. THIS CHANGE ORDER IS ISSUED PURSUANT TO: (Specify authority) THE CHANGES SET FORTH IN ITEM 14 ARE MADE IN THE CONTRACT ORDER NO. IN ITEM 10A.
	B. THE ABOVE NUMBERED CONTRACT/ORDER IS MODIFIED TO REFLECT THE ADMINISTRATIVE CHANGES (such as changes in paying office, appropriation data, etc.) SET FORTH IN ITEM 14, PURSUANT TO THE AUTHORITY OF FAR 43.103(b).
	C. THIS SUPPLEMENTAL AGREEMENT IS ENTERED INTO PURSUANT TO AUTHORITY OF:
X	D. OTHER (Specify type of modification and authority) BILTAERAL OTHER ADMIN PWS AMEND- NO POP & NO COST EXTENSION

E. IMPORTANT: Contractor ☐ is not ☒ is required to sign this document and return 1 copies to the issuing office.

14. DESCRIPTION OF AMENDMENT/MODIFICATION (Organized by UCF section headings, including solicitation/contract subject matter where feasible.)

DUNS Number: 198549560

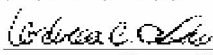
TOCOR: Britta Bierwagen

LIST OF CHANGES:

Reason for Modification: OTHER ADMIN ACTION - PWS AMEND (SEE ATTACHED) - NO POP & NO COST EXTENSION

Continued ...

Except as provided herein, all terms and conditions of the document referenced in Item 9 A or 10A, as heretofore changed, remains unchanged and in full force and effect.

15A. NAME AND TITLE OF SIGNER (Type or print)		16A. NAME AND TITLE OF CONTRACTING OFFICER (Type or print) Andrea Dehne	
15B. CONTRACTOR/OFFEROR (Signature of person authorized to sign)	15C. DATE SIGNED	16B. UNITED STATES OF AMERICA  (Signature of Contracting Officer)	16C. DATE SIGNED 05/10/2019

Previous edition unusable

CONTINUATION SHEET	REFERENCE NO. OF DOCUMENT BEING CONTINUED	PAGE	OF
	EP-C-17-031/0002/P00003	2	2

NAME OF OFFEROR OR CONTRACTOR
TETRA TECH, INC.

ITEM NO. (A)	SUPPLIES/SERVICES (B)	QUANTITY (C)	UNIT (D)	UNIT PRICE (E)	AMOUNT (F)
	Payment: RTP Finance Center US Environmental Protection Agency RTP-Finance Center (AA216-01) 109 TW Alexander Drive www2.epa.gov/financial/contracts Durham NC 27711 Period of Performance: 09/26/2017 to 09/25/2019				

PERFORMANCE WORK STATEMENT
EP-C-17-031
PR-ORD-17-01962
TO # 0002

TITLE: Vulnerability-based Framework to Assess Long-term Trends and Resilience in Aquatic Ecosystems

EAS Short Title: Regional Monitoring Networks

Task Order COR (TOCOR)	Alternate Task Order COR (ATOCOR)
Name: Britta Bierwagen Office: ORD/NCEA/GCRP 1200 Pennsylvania Ave., NW (MC 8601P) Washington, DC 20460 Phone: 703-347-8613 Fax: 703-347-8694 Email: Bierwagen.Britta@epa.gov	Name: Susan Julius Office: ORD/NCEA/GCRP 1200 Pennsylvania Ave., NW (MC 8601P) Washington, DC 20460 Phone: 703-347-8619 Fax: 703-347-8694 Email: Julius.Susan@epa.gov

PERIOD OF PERFORMANCE: Date of Task Order award through 18 months following award

NCEA's Exposure Analysis and Risk Characterization Group

The National Center for Environmental Assessment's (NCEA's) Exposure Analysis and Risk Characterization Group (EARCG) within EPA's Office of Research and Development assesses complex environmental issues to inform and improve the next generation of environmental decisions. EARCG uses the best available science to inform management and policy decisions through innovative synthesis, assessment, and research to fill critical knowledge gaps by working with stakeholders and partners to identify and address both near and long term challenges associated with a changing environment. EARCG addresses scientific issues that focus on the impacts from local and global stressors to ecosystems and resources, water quality and drinking water, air quality, human health and well-being, and assessments of the impacts of potential response strategies. Of particular interest are assessments of the potential vulnerability of aquatic ecosystems to a variety of long-term stressors, including land use change, changes to biogeochemical cycles, hydrologic changes, and climatic changes, in order to inform state, tribal and regional restoration and resilience efforts. Vulnerability and adaptation assessment activities support EPA's mission and responsibilities as defined by the Clean Water Act (CWA), and are designed to build the capacity of EPA program and regional offices, water and wetland managers, and other decision-makers to protect and restore aquatic ecosystems.

BACKGROUND

The EARCG has worked with EPA's Office of Water, the Regions, states, and tribes to build capacity in long-term monitoring, deployment of continuous sensors, and development of suitable indicators to detect long-term trends. This work has led to the development of Regional

Monitoring Networks in Regions 1-7 in streams, Regions 1, 2 and 5 in lakes, and Region 3 in wetlands. The initial focus is on long-term monitoring of least-disturbed sites near headwaters. Workshops, webinars, and other presentations have led to subsequent interest by other regions and programs to conduct similar vulnerability assessments that support the development of monitoring networks to detect long-term trends in aquatic ecosystems.

PURPOSE OF THIS TASK ORDER (TO)

The purpose of this TO is to provide support to EPA to further develop vulnerability assessments across aquatic ecosystems and geographic scales that serve as the analytical foundation of Regional Monitoring Networks (RMNs). The purpose of the RMNs is to detect long-term trends at least-disturbed sites and to inform restoration activities designed to improve environmental conditions through long-term resilience. Specifically, deliverables from this TO will

- (1) inform a plan (in conjunction with EPA's National Aquatic Resource Survey team) for nationwide multi-objective monitoring networks in streams and lakes based on vulnerability assessments; and
- (2) illustrate analyses and summary statistics of continuous and discrete data collected by RMN partners.

This TO will continue to support states and tribes in the development of RMNs, the analysis of data to assess variability and trends, and the assessment of restoration activities that improve environmental conditions for long-term resilience.

DESCRIPTION OF TASKS

TASK 1: Communication and QAPP development

SubTask 1.1. Communication and Regular Reporting

The contractor shall schedule weekly project meetings throughout the period of performance of this Task Order.

Task 1.1 Deliverable 1.1: Weekly conference calls to provide status updates. Due each week for the duration of this TO.

SubTask 1.2. Develop QAPP

All work conducted under this task order shall be performed pursuant to an EPA-approved Quality Assurance Project Plan (QAPP). The QAPP shall be submitted for review and approval by the TOCOR and the EPA QA Officer 14 days after TO award. The QAPP shall be in conformance with EPA's *Requirements for Quality Assurance Project Plans* (EPA QA/R-5). Portions of this TO relevant to modeling will reference *Guidance for Quality Assurance Project Plans for Modeling* (EPA QA/G-5M), while portions of this TO relevant to geospatial data will reference *Guidance for Quality Assurance Project Plans for Geospatial Data* (EPA QA/G-5G). Elements from these sources will be used to derive a single QAPP for this TO.

All electronic deliverables (i.e., computer files) shall be submitted in a format acceptable to EPA.

Tasks 2 through 8 may not begin until receiving in writing from the EPA TOCOR that EPA has approved the QAPP.

Task 1.2 Deliverable 1.2.A: QAPP submitted to the TOCOR for review 14 days after TO award.

Task 1.2 Deliverable 1.2.B: Final QAPP addressing TOCOR's and QA officer's comments on the QAPP due one (1) week after receiving comments.

TASK 2: Advancing vulnerability assessment methods

Previous work under WA 4-01 (EP-C-12-060) has advanced both the theory and application of vulnerability assessments to support monitoring in streams. This task shall finalize articles on (1) advancing the application of vulnerability assessments and (2) using VT data to examine community responses and recovery from extreme events. Results from these tasks shall be suitable to present at national or regional meetings.

SubTask 2.1. Journal article on advancing the application of vulnerability assessments

The contractor shall revise the existing draft, "Advancing the Application of Vulnerability Assessments" for submission to *Ecology Letters* as a *Perspectives* or *Syntheses* piece.

Task 2.1 Deliverable 2.1.A: Revised journal article based on internal review comments ready for submission to journal due 4 weeks after receiving comments from TOCOR.

Task 2.1 Deliverable 2.1.B: Revised journal article based on external review comments due 4 weeks after receiving comments on Deliverable 2.1.A.

SubTask 2.2. Journal article on response and recovery of VT stream communities to heavy precipitation events and flooding

Based on internal review draft developed under WA 4-01 on contract EP-C-12-060, the contractor shall address comments and produce a revised draft journal article to submit to a suitable journal.

Task 2.2 Deliverable 2.2.A: Respond to internal review comments and submit journal article, due 4 weeks after receipt of internal review comments from TOCOR.

Task 2.2 Deliverable 2.2.B: Submit updated manuscript to journal, due 2 weeks after receiving amendment.

TASK 3: Support for regional networks in streams and lakes to advance data analysis

The existing RMNs in Regions 1-7 require continued engagement to ensure that (1) continuous data is quality controlled, formatted, and discoverable by OW's 52North server; (2) biological data can be uploaded to the Water Quality Exchange; (3) states and tribes understand equipment usage and data management scripts; and (4) states and tribes provide updates on status and continue to learn from each other across the networks.

SubTask 3.1. Continue Interactions with Regions 1-7 to further monitoring methods

The contractor shall continue collaboration with Regions 1-7 and their states and tribes to help assist with continuous and discrete data management through webinars and potential workshops. This subtask shall require several conference calls and webinars among RMN participants. Interactions during regional and national meetings (e.g., SWPBA, tribal workshops, NWQMC, SFS) also may facilitate training on R scripts and equipment and participation by states and tribes. This task shall include meeting/conference travel.

Task 3.1 Deliverable 3.1.A: Conduct webinar on status of RMNs, including update on sensor deployments by partners, data collected, amendments to the RMN QAPP, site changes/additions, and other lessons learned by partners. Presentation shall include initial example analyses conducted by the Contractor on RMN data submitted thus far. Due during October 2017 based on RMN partner availability.

Task 3.1 Deliverable 3.1.B: Conduct webinar on continuous sensor R scripts and R Shiny application to familiarize RMN partners with QAQC procedures, consistent sensor configuration, taxonomic harmonization efforts using BioData as baseline, and formatting of data. The webinar also shall cover possibilities for making sensor data discoverable by OW's 52North server. Due 2 weeks after Deliverable 3.1.A.

Task 3.1 Deliverable 3.1.C: Updated status forms (describing sensor deployments and data collection for each RMN site) for each state, tribe and Region participating in RMNs. Due 2 weeks before the end of the period of performance of the TO.

Task 3.1 Deliverable 3.1.D: Conduct webinar on updates for RMN partners during summer 2018. Presentation shall include further development of methods and analyses, as well as lessons learned. Due during summer 2018 based on RMN partner availability.

Task 3.1 Deliverable 3.1.E: Develop YouTube video as training material on QAQC R scripts for continuous sensor data. Due 4 weeks after Deliverable 3.1.B.

SubTask 3.2. Develop scripts to advance continuous and discrete data analyses

The contractor shall use the data collected by existing RMNs to highlight analyses that have near-term and longer term applications to state and tribal decision making and environmental management. The contractor shall select a state or tribe to pilot the steps necessary to pull data together. Analysis outputs shall summarize the data and include visualizations of the data by site, across endpoints (e.g., temperature, hydrology, biology), and by geography (e.g., state, region).

Analyses selected as useful by partners shall be formatted for potential use by a web application that could retrieve data from continuous sensors and discrete data archives. This TO will not develop such a web application, since EPA/OW and USGS may be developing these capabilities through joint work on the Water Quality Portal. Eventually, users should be able to query the

data to calculate suitable biological metrics, in addition to thermal and hydrologic metrics through a common interface.

Task 3.2 Deliverable 3.2.A: Webinar to show RMN partners initial analysis results using discrete and continuous data collected at RMN sites to gather feedback on which analyses to further develop into web applications. Due 3 months after Deliverable 3.1.A.

Task 3.2 Deliverable 3.2.B: Draft analysis plan focusing on R code for analyses, proposed analyses, and outputs and describing potential steps for a web application, including interface, APIs, databases and servers from which to retrieve necessary data. Due 2 weeks after Deliverable 3.2.A.

Task 3.2 Deliverable 3.2.C: Final analysis plan, revised based on TOCOR input. Due 2 weeks after receipt of comments from TOCOR.

Task 3.2 Deliverable 3.2.D: Draft version of analytical scripts and summary statistics and demonstration of analyses to RMN partners. Due 1 month after Deliverable 3.2.C.

Task 3.2 Deliverable 3.2.E: Final analytical scripts and statistics incorporating RMN partner feedback and TOCOR comments. Due 1 month after Deliverable 3.2.D.

SubTask 3.3. Develop journal article that highlights RMN data analyses

Based on partner engagements in SubTasks 3.1 and 3.2, the Contractor shall develop a journal article that highlights certain states or regions in terms of their RMN data in an examination of natural variability in a variety of relevant metrics or across taxa, and explores associations between these changes and changing thermal and hydrologic conditions.

Task 3.3 Deliverable 3.3.A: Outline of article. Due 2 months after Deliverable 3.2.A.

Task 3.3 Deliverable 3.3.B: Initial draft of article and presentation to gather feedback from states/regions highlighted in article. Due 6 weeks after Deliverable 3.3.A.

Task 3.3 Deliverable 3.3.C: Revisions to analyses and article based on webinar and email feedback on Deliverable 3.3.B. Due 4 weeks after Deliverable 3.3.B.

Task 3.3 Deliverable 3.3.D: Internal review draft of article. Due 3 weeks after receipt of comments from TOCOR on Deliverable 3.3.C.

Task 3.3 Deliverable 3.3.E: External review draft to submit to journal. Due 2 weeks after receipt of internal review draft comments from TOCOR.

TASK 4: Inclusion of restoration effectiveness and recovery potential in monitoring framework within R10 Biological Condition Gradient (BCG) context

As additional RMNs begin stream monitoring efforts, a logical next step is to examine how the RMNs can interact, what remaining areas need to be sampled to provide nationwide data on climate change effects in streams, and how monitoring can feed into efforts to improve long-

term resilience of watersheds and aquatic ecosystems. The contractor shall further develop an existing white paper (from WA 4-01 on contract EP-C-12-060) on a nationwide monitoring framework to elaborate on restoration and recovery potential considerations that can help states and tribes implement and monitoring improvements in environmental conditions for long-term resilience. This work builds on interactions with Region 10 and OST on the development of a BCG framework that includes climatic considerations, and potentially interactions with Region 8 to understand long-term effectiveness of restoration.

Use of OW's recovery potential tool in the context of the R10 BCG may assist with identification of sites vulnerable to long-term thermal or hydrologic changes, when combined with other data and model outputs. The contractor shall conduct analyses appropriate to identify vulnerable sites within the context of the R10 BCG outputs.

Based on these analyses and in conjunction with Region 10 (and possibly other Regions) and OW staff in coordination with the TOCOR, the Contractor shall propose a framework for including restoration effectiveness and recovery potential of sites within the nationwide monitoring framework. The goal is to highlight sites that states and tribes can select for restoration that will ultimately improve environmental conditions and confer long-term resilience to aquatic ecosystems (if restoration is effective and sites are protected). These sites could be added to RMNs. Monitoring at these sites ideally would show improvement in environmental conditions (e.g., improvement in BCG level assignment, improvement in biological metrics) and would demonstrate resilience to long-term environmental changes (i.e., serve as refugia).

Deliverable 4.A: Generate BCG outputs for R10 sites and identify sites with greatest amount of flow and temperature change to evaluate inter-annual variability in order to rank sites by restoration or recovery potential (along with other suitable data). Due 8 weeks after TO award.

Deliverable 4.B: Using results from Deliverable 4.A., propose a framework for including restoration effectiveness and recovery potential of sites within the nationwide monitoring framework. Due 6 weeks after Deliverable 4.A.

Deliverable 4.C: Share draft framework through webinar with OW/OWOW and other RMN partners to discuss potential sites and implementation opportunities. Due 2 weeks after receiving comments from TOCOR on Deliverable 4.B.

Deliverable 4.D: Draft journal article building on existing white paper to include restoration and recovery potential considerations that can help states and tribes implement and monitoring improvements in environmental conditions for long-term resilience. Due 4 weeks after Deliverable 4.C.

Deliverable 4.E: Internal review draft incorporating comments from TOCOR and co-authors on Deliverable 4.D. Due 4 weeks after receiving comments on Deliverable 4.D.

TASK 5: Lake RMNs, QAPP, and assessment of monitoring methods report

Regions 1, 2, and 5 are developing long-term monitoring network for lakes. The contractor shall build on information gathered during webinars with states, tribes and regions to develop a

monitoring plan for lakes. The contractor shall build on a draft white paper and draft protocols (both from WA 4-01 under contract EP-C-12-060) to develop a report (may be web-based) that assesses current monitoring methods appropriate for lake RMN goals and consistent with practices developed under Task 3. This task also shall include development of a draft QAPP for lake RMNs in partnership with states and regions.

Deliverable 5.A: Develop draft outline of assessment report on monitoring methods for lake RMNs and proposed state or federal partners to engage in development of methods sections and evaluations. Due 4 weeks after TO award.

Deliverable 5.B: Hold webinar with RMN partners and OW/NLA to discuss Deliverable 5.A. Due 1 month after Deliverable 5.A.

Deliverable 5.C: Develop draft assessment report. Due 6 weeks after Deliverable 5.B.

Deliverable 5.D: Develop draft QAPP and training materials (including presentation and YouTube videos) on new methods, QAQC, sensor and data formatting presented in Deliverable 5.C. Due 3 weeks after Deliverable 5.C.

Deliverable 5.E: Present training materials and QAPP through webinar and collect feedback from partners. Due 2 weeks after approval of Deliverable 5.D.

Deliverable 5.F: Revise Deliverable 5.C. based on input to Deliverable 5.D. and submit for internal review. Due 2 weeks after Deliverable 5.E.

Deliverable 5.G.: Revise report based on internal review comments and submit comment-response document. Due 4 weeks after receipt of comments from TOCOR.

Deliverable 5.H.: Revise report based on external review comments and submit comment-response document. Due 6 weeks after receipt of comments from TOCOR.

Deliverable 5.I.: Finalized QAPP on lakes protocols. Due 2 weeks after Deliverable 5.D.

TASK 6: Finalize synthesis of current research on climate-relevant traits and suites of traits for publication

The Contractor shall take the lead in coordinating authors from the 2016 Society for Freshwater Science special session to submit sections for the paper, gather input on a first draft from the author team, respond to internal review comments, and submit a paper on a synthesis of climate-relevant traits.

Deliverable 6.A: Coordinate individual contributions to the manuscript and correspond with authors during the process. Due 2 weeks after receipt of all sections from co-authors.

Deliverable 6.B: Based on comments and edits from TOCOR and co-authors, submit draft article ready for EPA internal review. Due 2 weeks after receipt of comments and edits from TOCOR and co-authors.

Deliverable 6.C: Revise article with assistance from co-authors, addressing internal review comments and developing a comment-response document. Due 4 weeks after receipt of internal review comments from TOCOR. After EPA clearance, the article may be submitted to a journal for external review.

Deliverable 6.D: Revise article with assistance from co-authors, addressing external review comments. Due 3 weeks after receipt of journal comments.

Task 7: Assist with and submit classification manuscript

The Contractor shall assist with a manuscript based on the classification analyses for Regions 1-4, including potential additional data and analyses (e.g., data for validation, validation analysis, and identification of intermittent streams), data formatting, and development of figures and maps. The manuscript shall focus on classification in terms of its applicability to monitoring for climate change effects.

Deliverable 7.A: Draft classification manuscript including additional analyses. Due 8 weeks after TO award.

Deliverable 7.B: Submit updated GIS and Access database files and the new tables and figures for the manuscript. Due 4 weeks after receiving amendment.

Deliverable 7.C: Manuscript for internal review. Due 4 weeks after receiving comments from TOCOR on Deliverable 7.B.

Deliverable 7.D: Revised manuscript responding to internal review comments and separate comment-response document. Due 8 weeks after receiving internal review comments from TOCOR.

Deliverable 7.E: Submit manuscript to selected journal. Due 2 weeks after receiving TOCOR approval following ORD clearance.

Task 8: A Plan for nationwide multi-objective monitoring networks in streams and lakes based on vulnerability assessments

The Contractor shall develop a plan for nationwide, multi-objective monitoring networks in streams and lakes based on vulnerability assessments. This plan shall be developed in conjunction with OW's National Aquatic Resource Surveys (NARS) in order to build on their goals for a long-term reference site network. The Contractor shall set up a conference call with the NARS leads to document their goals for a reference site network. The plan shall make use of the deliverables from Tasks 3-5 to integrate analytic requirements, partner input, site selection

based on vulnerability assessment and restoration/recovery potential, as well as methodological best practices for stream, lake, and wetland sampling.

Deliverable 8.A: Call with OWOW to discuss NARS goals and outline of plan that incorporates NARS goals for annual reference site sampling across aquatic ecosystems and existing RMN criteria and protocols. Due 2 weeks after Deliverable 5.F.

Deliverable 8.B: Webinar with key NARS staff and key RMN partners (e.g., R5 staff) to discuss Deliverable 8.A. Due 2 weeks after TOCOR approval of Deliverable 8.A.

Deliverable 8.C: Draft plan for nationwide multi-objective monitoring networks, incorporating feedback received on Deliverable 8.B. Due 4 weeks after Deliverable 8.B.

Deliverable 8.D: Internal review draft of plan. Due 2 weeks after receipt of comments on Deliverable 8.C.

Deliverable 8.E: External draft of plan revised based on internal review comments. Due 2 weeks after receipt of internal review comments.

SCHEDULE OF BENCHMARKS & DELIVERABLES:

Task No.	SubTask No.	DELIVERABLE	Incremental Schedule
1	1.1	1.1. Weekly conference calls	Due each week for the duration of this TO.
1	1.2	1.2.A. Update QAPP	Due 14 days after TO award.
1	1.2	1.2.B. Revised QAPP	Due 1 week after TOCOR comments
2	2.1	2.1.A. Revised journal article to submit	Due 4 weeks after receiving comments from TOCOR
2	2.1	2.1.B. Revised journal article to publish	Due 4 weeks after receiving comments on 2.1.A.
2	2.2	2.2.A. Draft journal article to submit	Due 4 weeks after receipt of comments
2	2.2	2.2.B. Submit updated manuscript to journal	Due 2 weeks after receipt of amendment
3	3.1	3.1.A. Webinar on RMN status	Due during October 2017
3	3.1	3.1.B. Webinar on R scripts	Due 2 weeks after Deliverable 3.1.A
3	3.1	3.1.C. Updated status forms	Due 2 weeks before end of TO
3	3.1	3.1.D. Webinar on RMN updates	Due during summer 2018
3	3.1	3.1.E. YouTube training video	Due 4 weeks after Deliverable 3.1.B

3	3.2	3.2.A. Webinar on initial RMN data analyses	Due 3 months after Deliverable 3.1.A
3	3.2	3.2.B. Draft analysis plan	Due 2 weeks after Deliverable 3.2.A
3	3.2	3.2.C. Final analysis plan	Due 2 weeks after TOCOR comments
3	3.2	3.2.D. Draft version of scripts and demonstration	Due 1 month after Deliverable 3.2.C.
3	3.2	3.2.E. Final scripts	Due 1 month after Deliverable 3.2.D
3	3.3	3.3.A. Outline of article	Due 2 months after Deliverable 3.2.A
3	3.3	3.3.B. Initial article and presentation draft	Due 6 weeks Deliverable 3.3.A
3	3.3	3.3.C. Revised analyses and article	Due 4 weeks after Deliverable 3.3.B
3	3.3	3.3.D. Internal review draft	Due 3 weeks after comments on Deliverable 3.3.C
3	3.3	3.3.E. External review draft to submit	Due 2 weeks after receipt of comments
4	4	4.A. Analytical outputs	Due 8 weeks after TO initiation
4	4	4.B. Proposed framework	Due 6 weeks after Deliverable 4.A
4	4	4.C. Webinar on framework	Due 2 weeks after comments on Deliverable 4.B
4	4	4.D. Draft journal article	Due 4 weeks after Deliverable 4.C
4	4	4.E. Internal review draft	Due 4 weeks after comments on Deliverable 4.D
5	5	5.A. Draft outline of assessment report	Due 4 weeks after TO initiation
5	5	5.B. Webinar	Due 1 month after Deliverable 5.A
5	5	5.C. Draft assessment report	Due 6 weeks after Deliverable 5.B
5	5	5.D. Draft QAPP and training materials	Due 3 weeks after Deliverable 5.C
5	5	5.E. Webinar on training materials and QAPP	Due 2 weeks after Deliverable 5.D.
5	5	5.F. Revised assessment report	Due 2 weeks after deliverable 5.E
5	5	5.G. External review draft report	Due 4 weeks after receipt of internal review comments
5	5	5.H. Final report	Due 6 weeks after receipt of external review comments
5	5	5.I. Finalized QAPP	Due 2 weeks after Deliverable 5.D
6	6	6.A. Author coordination of sections	Due 2 weeks after receipt of co-author sections
6	6	6.B. Internal review draft	Due 2 weeks after receipt of comments
6	6	6.C. External review draft	Due 4 weeks after receipt of internal review comments

6	6	6.D. Final article	Due 3 weeks after journal comments
7	7	7.A. Draft classification manuscript	Due 8 weeks after TO initiation
7	7	7.B. Updated GIS, Access files, tables and figures	Due 4 weeks after receipt of amendment
7	7	7.C. Internal review draft	Due 4 weeks after TOCOR comments on Deliverable 7.B.
7	7	7.D. Revised manuscript	Due 8 weeks after receipt of internal review comments
7	7	7.E. Submit manuscript	Due 2 weeks after TOCOR approval to submit
8	8	8.A. Outline of plan	Due 2 weeks after Deliverable 5.F
8	8	8.B. Webinar	Due 2 weeks after TOCOR approval of Deliverable 8.A
8	8	8.C. Draft plan	Due 4 weeks after Deliverable 8.B
8	8	8.D. Internal review draft of plan	Due 2 weeks after comments on Deliverable 8.C
8	8.1	8.E. External draft of plan	Due 2 weeks after receipt of internal review comments

REPORTING

All documentation and reporting under this TO shall be in compliance with contract requirements. See contract clause F.2, F.3, and J.1 "List of Documents, Exhibits and Other Attachments, Number 2 - Reports of Work".

Additional requirements specific to this TO are as follows:

Electronic deliverables must be in an original file format that can be supported by EPA after the end of the Period of Performance of the TO. The standard office software at EPA is MS Office. The standard GIS software at EPA is ESRI ArcGIS.

TRAVEL

Travel is anticipated for no more than 4 conferences or regional biologists meetings under Task 3, such as Society for Freshwater Science in Detroit, MI or the R1, R3 or R4 biologists meeting.

CONTRACTOR IDENTIFICATION

Contractor personnel shall always identify themselves as Contractor employees by name and organization and physically display that information through an identification badge. Contractor personnel are prohibited from acting as the Agency's official representative.

The Contractor shall refer any questions relating to the interpretation of EPA policy, guidance, or regulation to the TOCOR.

TECHNICAL DIRECTION

The TOCOR is authorized to provide technical direction that clarifies the performance work statement (PWS) as set forth in this task order. Before initiating any action under technical direction, the contractor shall ensure that the technical direction falls within the scope of work for this task order. The technical direction shall be issued in writing by the TOCOR within four working days of verbal issuance. This will be forwarded to the CL-COR and CO for their information and necessary actions. The CO is the only individual authorized to make changes to this task order or contract. Any changes to the scope of work must be issued by the CO via modification to the task order or contract. Technical direction includes direction to the contractor that assists the contractor in accomplishing individual tasks deemed appropriate under the PWS, as well as comments and approval of reports and other deliverables.

AMENDMENT OF SOLICITATION/MODIFICATION OF CONTRACT				1. CONTRACT ID CODE		PAGE OF PAGES	
						1 2	
2. AMENDMENT/MODIFICATION NO.		3. EFFECTIVE DATE		4. REQUISITION/PURCHASE REQ. NO.		5. PROJECT NO. (If applicable)	
P00004		See Block 16C		PR-ORD-19-02454			
6. ISSUED BY		CODE		7. ADMINISTERED BY (If other than Item 6)		CODE	
CAD							
CAD US Environmental Protection Agency 26 West Martin Luther King Drive Mail Code: W136 Cincinnati OH 45268-0001							
8. NAME AND ADDRESS OF CONTRACTOR (No., street, county, State and ZIP Code)				(x)			
TETRA TECH, INC. Attn: George Townsend 10306 EATON PL STE 340 FAIRFAX VA 22030				9A. AMENDMENT OF SOLICITATION NO.			
				9B. DATED (SEE ITEM 11)			
				x			
				10A. MODIFICATION OF CONTRACT/ORDER NO.			
				EP-C-17-031			
				0002			
				10B. DATED (SEE ITEM 13)			
				09/21/2017			
CODE 198549560		FACILITY CODE					
11. THIS ITEM ONLY APPLIES TO AMENDMENTS OF SOLICITATIONS							
<input type="checkbox"/> The above numbered solicitation is amended as set forth in Item 14. The hour and date specified for receipt of Offers <input type="checkbox"/> is extended. <input type="checkbox"/> is not extended. Offers must acknowledge receipt of this amendment prior to the hour and date specified in the solicitation or as amended, by one of the following methods: (a) By completing Items 8 and 15, and returning _____ copies of the amendment; (b) By acknowledging receipt of this amendment on each copy of the offer submitted; or (c) By separate letter or electronic communication which includes a reference to the solicitation and amendment numbers. FAILURE OF YOUR ACKNOWLEDGEMENT TO BE RECEIVED AT THE PLACE DESIGNATED FOR THE RECEIPT OF OFFERS PRIOR TO THE HOUR AND DATE SPECIFIED MAY RESULT IN REJECTION OF YOUR OFFER. If by virtue of this amendment you desire to change an offer already submitted, such change may be made by letter or electronic communication, provided each letter or electronic communication makes reference to the solicitation and this amendment, and is received prior to the opening hour and date specified.							
12. ACCOUNTING AND APPROPRIATION DATA (If required)							
See Schedule							
13. THIS ITEM ONLY APPLIES TO MODIFICATION OF CONTRACTS/ORDERS. IT MODIFIES THE CONTRACT/ORDER NO. AS DESCRIBED IN ITEM 14.							
CHECK ONE	A. THIS CHANGE ORDER IS ISSUED PURSUANT TO: (Specify authority) THE CHANGES SET FORTH IN ITEM 14 ARE MADE IN THE CONTRACT ORDER NO. IN ITEM 10A.						
	B. THE ABOVE NUMBERED CONTRACT/ORDER IS MODIFIED TO REFLECT THE ADMINISTRATIVE CHANGES (such as changes in paying office, appropriation data, etc.) SET FORTH IN ITEM 14, PURSUANT TO THE AUTHORITY OF FAR 43.103(b).						
	C. THIS SUPPLEMENTAL AGREEMENT IS ENTERED INTO PURSUANT TO AUTHORITY OF:						
X	D. OTHER (Specify type of modification and authority) BILATERAL OTHER ADMIN - NO COST POP EXTENSION						
E. IMPORTANT: Contractor <input type="checkbox"/> is not <input checked="" type="checkbox"/> is required to sign this document and return <u>1</u> copies to the issuing office.							
14. DESCRIPTION OF AMENDMENT/MODIFICATION (Organized by UCF section headings, including solicitation/contract subject matter where feasible.)							
DUNS Number: 198549560							
TOCOR: Britta Bierwagen Max Expire Date: 06/24/2020							
LIST OF CHANGES:							
Reason for Modification: Other Administrative Action to provide for a final TO extension; specifically for deliverable 2.1b, 3.3, 5.H, 5.I and 7.D. All parties are in agreement that future efforts will be made to prevent these types of delays.							
Period of Performance End Date changed from 25-SEP-19 to 24-JUN-20							
Maximum Potential Expiration Date changed to : 06/24/2020							
CHANGES FOR LINE ITEM NUMBER: 2							
Continued ...							
Except as provided herein, all terms and conditions of the document referenced in Item 9 A or 10A, as heretofore changed, remains unchanged and in full force and effect.							
15A. NAME AND TITLE OF SIGNER (Type or print)				16A. NAME AND TITLE OF CONTRACTING OFFICER (Type or print)			
				Andrea Dehne			
15B. CONTRACTOR/OFFEROR		15C. DATE SIGNED		16B. UNITED STATES OF AMERICA		16C. DATE SIGNED	
(Signature of person authorized to sign)				 (Signature of Contracting Officer)		ELECTRONIC SIGNATURE 09/23/2019	

NAME OF OFFEROR OR CONTRACTOR
TETRA TECH, INC.

ITEM NO. (A)	SUPPLIES/SERVICES (B)	QUANTITY (C)	UNIT (D)	UNIT PRICE (E)	AMOUNT (F)
	<p>End Date changed from 25-SEP-19 to 24-JUN-20</p> <p>CHANGES FOR DELIVERY LOCATION: CAD</p> <p>Delivery Date changed from 09/25/2019 to 06/24/2020</p> <p>Payment:</p> <p> RTP Finance Center US Environmental Protection Agency RTP-Finance Center (AA216-01) 109 TW Alexander Drive www2.epa.gov/financial/contracts Durham NC 27711 </p> <p>Period of Performance: 09/26/2017 to 06/24/2020</p>				

AMENDMENT OF SOLICITATION/MODIFICATION OF CONTRACT				1. CONTRACT ID CODE		PAGE OF PAGES 1 2	
2. AMENDMENT/MODIFICATION NO. P00005		3. EFFECTIVE DATE See Block 16C		4. REQUISITION/PURCHASE REQ. NO.		5. PROJECT NO. (If applicable)	
6. ISSUED BY CAD US Environmental Protection Agency 26 West Martin Luther King Drive Mail Code: W136 Cincinnati OH 45268-0001		CODE CAD		7. ADMINISTERED BY (If other than Item 6)		CODE	
8. NAME AND ADDRESS OF CONTRACTOR (No., street, county, State and ZIP Code) TETRA TECH, INC. Attn: George Townsend 10306 EATON PL STE 340 FAIRFAX VA 22030				(x)		9A. AMENDMENT OF SOLICITATION NO.	
						9B. DATED (SEE ITEM 11)	
				x		10A. MODIFICATION OF CONTRACT/ORDER NO. EP-C-17-031 0002	
						10B. DATED (SEE ITEM 13) 09/21/2017	
CODE 198549560		FACILITY CODE					
11. THIS ITEM ONLY APPLIES TO AMENDMENTS OF SOLICITATIONS							
<input type="checkbox"/> The above numbered solicitation is amended as set forth in Item 14. The hour and date specified for receipt of Offers <input type="checkbox"/> is extended. <input type="checkbox"/> is not extended. Offers must acknowledge receipt of this amendment prior to the hour and date specified in the solicitation or as amended, by one of the following methods: (a) By completing Items 8 and 15, and returning _____ copies of the amendment; (b) By acknowledging receipt of this amendment on each copy of the offer submitted; or (c) By separate letter or electronic communication which includes a reference to the solicitation and amendment numbers. FAILURE OF YOUR ACKNOWLEDGEMENT TO BE RECEIVED AT THE PLACE DESIGNATED FOR THE RECEIPT OF OFFERS PRIOR TO THE HOUR AND DATE SPECIFIED MAY RESULT IN REJECTION OF YOUR OFFER. If by virtue of this amendment you desire to change an offer already submitted, such change may be made by letter or electronic communication, provided each letter or electronic communication makes reference to the solicitation and this amendment, and is received prior to the opening hour and date specified.							
12. ACCOUNTING AND APPROPRIATION DATA (If required) See Schedule				Net Decrease:		-\$.02	
13. THIS ITEM ONLY APPLIES TO MODIFICATION OF CONTRACTS/ORDERS. IT MODIFIES THE CONTRACT/ORDER NO. AS DESCRIBED IN ITEM 14.							
CHECK ONE		A. THIS CHANGE ORDER IS ISSUED PURSUANT TO: (Specify authority) THE CHANGES SET FORTH IN ITEM 14 ARE MADE IN THE CONTRACT ORDER NO. IN ITEM 10A.					
		B. THE ABOVE NUMBERED CONTRACT/ORDER IS MODIFIED TO REFLECT THE ADMINISTRATIVE CHANGES (such as changes in paying office, appropriation data, etc.) SET FORTH IN ITEM 14, PURSUANT TO THE AUTHORITY OF FAR 43.103(b).					
		C. THIS SUPPLEMENTAL AGREEMENT IS ENTERED INTO PURSUANT TO AUTHORITY OF:					
X		D. OTHER (Specify type of modification and authority) BILATERAL AGREEMENT - Order Closeout in its Entirety - All Deliverables Received and Invoices Paid					
E. IMPORTANT: Contractor <input type="checkbox"/> is not <input checked="" type="checkbox"/> is required to sign this document and return <u>1</u> copies to the issuing office.							
14. DESCRIPTION OF AMENDMENT/MODIFICATION (Organized by UCF section headings, including solicitation/contract subject matter where feasible.)							
DUNS Number: 198549560							
TOCOR: Britta Bierwagen Max Expire Date: 06/24/2020							
LIST OF CHANGES:							
Reason for Modification: FFP Order Closeout in its Entirety - All Deliverables Received and Invoices Paid							
Total Amount for this Modification: -\$.02							
New Total Amount for this Version: \$129,723.98							
New Total Amount for this Award: \$129,723.98							
Obligated Amount for this Modification: -\$.02							
New Total Obligated Amount for this Award: \$79,723.98							
Continued ...							
Except as provided herein, all terms and conditions of the document referenced in Item 9 A or 10A, as heretofore changed, remains unchanged and in full force and effect.							
15A. NAME AND TITLE OF SIGNER (Type or print)				16A. NAME AND TITLE OF CONTRACTING OFFICER (Type or print)			
				Andrea Dehne			
15B. CONTRACTOR/OFFEROR		15C. DATE SIGNED		16B. UNITED STATES OF AMERICA		16C. DATE SIGNED	
(Signature of person authorized to sign)				 (Signature of Contracting Officer)		ELECTRONIC SIGNATURE 08/25/2020	

CONTINUATION SHEET	REFERENCE NO. OF DOCUMENT BEING CONTINUED	PAGE	OF
	EP-C-17-031/0002/P00005	2	2

NAME OF OFFEROR OR CONTRACTOR
TETRA TECH, INC.

ITEM NO. (A)	SUPPLIES/SERVICES (B)	QUANTITY (C)	UNIT (D)	UNIT PRICE (E)	AMOUNT (F)
	<p>CHANGES FOR LINE ITEM NUMBER: 2</p> <p>Total Amount changed from \$129,724.00 to \$129,723.98</p> <p>Obligated Amount for this Modification: -\$0.02</p> <p>CHANGES FOR DELIVERY LOCATION: CPOD</p> <p>Amount changed from \$129,724.00 to \$129,723.98</p> <p>CHANGES FOR ACCOUNTING CODE: 17-18-C-262W000-401F84-2532-26A5C-17262WC748-002</p> <p>Amount changed from \$33,006.31 to \$33,006.29</p> <p>Payment:</p> <p>RTP Finance Center US Environmental Protection Agency RTP-Finance Center (AA216-01) 109 TW Alexander Drive www2.epa.gov/financial/contracts Durham NC 27711</p> <p>Period of Performance: 09/26/2017 to 06/24/2020</p>				